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# AN ACCOUNT OF SOME Experiments and Obſervations ON TAR-WATER:

Wherein is ſhown the QUANTITY of TAR that is therein.

Which was read before the ROYAL SOCIETY.

By *STEPHEN HALES*, D. D. F. R. S.

THE SECOND EDITION.

To which is added,

A LETTER from Mr. *REID*, TO Dr. *HALES*,

Concerning the NATURE of TAR, and a METHOD of obtaining it's *Medical Virtues*, free from it's *hurtful Oils* : Whereby alſo the STRENGTH of each DOSE may be the better aſcertained.

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# AN ACCOUNT OF SOME Experiments and Obſervations ON TAR-WATER:

## I.

1. AS the celebrated Tar-water, recommended by the worthy and learned Biſhop *Berkeley*, is ſaid to be taken with great Benefit by ſome, and Detriment by others; I thought it might probably be of uſe to inquire whether any, or what Quantity of Tar, there was in Tar-water, made with different kinds of Tar, different Degrees of ſtirring, and in dif-

ferent Ways of making it. A ſhort Account of which I ſhall give, without intereſting myſelf, either in Favour or Disfavour of a Medicine that is under the Inſpection of the proper Judges, as well as of all the reſt of the World.

2. UPON Inquiry from knowing Perſons, I find that *Norway* or *Swediſh* Tar, which is dark, thick and clear, without obſcure Grains in it, is accounted the beſt, for the general Uſes of Tar: But that the Tar which is made of the Tops of Fir-Trees, which are become very hard, by having lain long dead on the Ground, after having either fallen of themſelves, or being killed by the draining off their Turpentine Sap, thro' Baſin-like Notches cut near their Bottoms: (Theſe Tops are commonly called Light-wood, the poorer People making uſe of them inſtead of Candles:) This Tar being burned in a very ſtrong Fire of ſuch

dry Wood, is of a very cauſtick, corroding Nature, ſo as to be hurtful to Ropes, *&c.* for which reaſon it is not uſed in the Royal Navy. But the *American* Tar, which is made of green Fir-Trees, with a leſs degree of Fire, is eſteemed good, and is called green Tar; for which reaſon a Bounty, double the Value of the other, is allowed by the Government here, on Importation.

3. Having procured ſome *Norway* or *Swediſh* Tar, which was thirty Years old, and very thick and ſtiff; I, according to the Biſhop's Preſcription, made Tar-water in the proportion of a Gallon of Water to a Quart of Tar, ſtirring it four Minutes: I then took a Pint of this Tar-water, and evaporated it away in a *Florence* Flask, cut to a wide Orifice, with a red-hot circular Iron, and weighed. Beſides what flew off in Evaporation, there remained at the Bottom of the Flask

forty-four Grains of thick, dark, reddiſh Tar, of a bitteriſh burnt Taſte. On evaporating a like quantity of Tar-water, made with common, coarſe, ſtiff *American* Tar, in the ſame manner, there remained twenty-eight Grains of a like ſyrupy Tar; and ſixty one Grains in a Pint of Tar-water made with a ſtiff Tar, juſt brought from *Norway*. This Water was high coloured on ſtanding ſome days.

4. I evaporated away alſo a Pint of Tar-water, made with the old Tar, which had been ſtirred for half an Hour, in order to try how ſtrongly it might be impregnated with Tar. There remained ninety-three Grains, which Reſiduum was not all of it a ſyrupy Tar, as the former, but partly incruſted on the Sides of the Flask; which ſhews how much more of the groſſer Tar was incorporated in this Water than in the other. This was alſo evident by its greater and more

laſting Froth on ſhaking, and alſo by its deeper Colour, it becoming brown as Beer, on a few Days ſtanding: And even the thinner kind of Tar, which was ſtirred for eight Minutes, had twenty-ſix Grains of Tar left, on Evaporation of a Pint of its Water. Hence we ſee the Effects of ſtirring Tar-water much.

## II.

5. FINDING forty-four Grains in a Pint of the firſt Water, Section or Numb. 3. it occurred to me, that probably there might be leſs Tar in the Water, if it could be made without ſtirring it with a Stick, which ſtirring may impel ſome of the groſſer Tar into the Water, whence its too heating Quality is with good reaſon thought to ariſe. I therefore put half a Pint of Tar into a Tin Pot, whoſe Bottom was punched full of Holes, one ſixth of an Inch in Diameter, and half an

Inch diſtant from each other ; which I found to be a proper Size for this very thick Tar ; thro' which the Tar dropped gradually into a Quart of Water, when placed in hot Sunſhine ; or elſe at ſuch a diſtance before a Fire, as would give a like Degree of Heat, ſufficient to make it drop. But finding, on evaporating off a Pint of this thus prepared Tar-water, with Warmth, thirty-two Grains of thick Tar ; for it is well known, that Fluids in a warm State will imbibe a greater Quantity of Matter, than when cold : I made another Tar-ſtrainer, being a Box of Wood, which was ſquare, and two and an half Inches wide in the Clear within, and eight Inches deep, with a Pewter Bottom, which had twenty-five Holes in it, one eighth of an Inch in Diameter : There was alſo a wooden Plug or Rammer, whoſe bottom part was exactly fitted to it ; by which Plug, the cold Tar was gradually forced, in ſlender Streams, like Rain, thro the Bottom of the Strainer. There were fixed on each ſide of the Strainer Pieces of Wood two Feet long, like the Poles of Chairmens Chairs, on theſe the Strainer reſted at a proper diſtance over the Pot of Water.

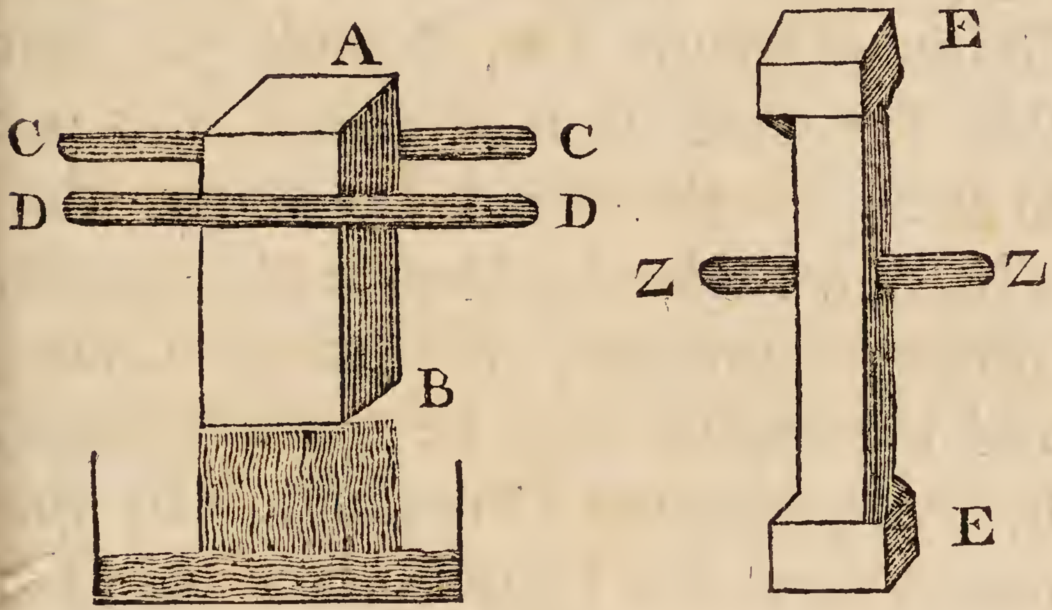

Fig. A B *the Strainer-box.* C C D D *the Arms or Poles two Feet long to reſt it on.* E E *the Plug.* Z Z, *a wooden Pin, which hindered the Bottom of the Plug from preſſing hard on the Bottom of the Strainer.*

I found but eighteen Grains of ſyrupy Tar, on evaporating a Pint of Tar-water thus prepared, by the ſame old Tar's dropping five times on it: And but ſix Grains in a like Quantity of Tar-water, made by dropping coarſe *American* Tar five times on the ſame Water; whereas in a Pint of Tar-water made by ſtirring ſome of the ſame Tar, there remained twenty-eight Grains of ſyrupy Tar, Numb. 3. But this Tar-water thus prepared, was not ſo ſtrong as the ſtirred Tar-water, tho' it had a conſiderable Degree of Strength, ſufficient probably for many Caſes; and if requiſite may be made ſtronger, by more repeated Droppings. By this means there is a large Surface of Tar expoſed to the Water, to be thereby impregnated with the Virtue of the Tar, without forcing in the groſſer Parts, by ſtirring with a Stick: For it ſeems probable, that there is not ſo great a quantity of the Surface of the Tar expoſed to the immediate Contact of the Water in ſtirring ſo ſtiff a Maſs of Tar, as in the dropping way. This being ſomething like Nature's Method of impregnating mineral Waters, with the Virtue of *Petroleum*, or Tar of the Earth, as they gently glide among it: By this means likewiſe, there will be a greater Certainty, in adjuſting the Strength of Tar-water; for the Strength of the Water will be proportionable to the numbers of the ſeveral Droppings, be they one, five or more.

6. I dropped the ſame half Pint of Tar, into twelve different Quarts of Water, till it became pretty inſipid as to the ſaline, acid Taſte, tho' it had ſtill a tarriſh Taſte. The Acid, in which the Virtue is thought principally to reſide, might be ſenſibly taſted in the fourth Quart, and farther; for the Drops of Tar are in every Operation formed, partly with a new Surface to expoſe to the Water. And it is obſerved in the Diſtillation of Turpentine, that ſome of this acid Spirit ariſes to the laſt, being ſtill intangled in the Turpentine.

7. WHEN Tar-waters of different Degrees of Strength were put into *Florence* Flasks, with other inverted Flasks fixed on them, and all were placed in the ſame Veſſel of hot Water; on breaking the upper Flasks, the volatile acid Spirit could very ſenſibly be taſted, eſpecially that of the ſtronger Tar-water; which ſhows that theſe Waters are impregnated therewith: and which, when diſtilled from Turpentine, Dr. *Boerhaave* in his Chemiſtry ſays, is the beſt vegetable-Acid that is known. This Acid in Tar-water will curdle Milk; yet Turpentine-water will not curdle Milk: which ſhows that Tar is conſiderably acidulated, by the Action of Fire in making. I find in a Pamphlet, intitled, *An Anſwer to a Letter to the Right Reverend the Biſhop of* Cloyne, *occaſioned by his Treatiſe on Tar-water*, that on diſtilling twenty-two Pounds of the beſt *Norway* Tar by two Retorts, there was

| | *Pounds.* | *Ounces.* |
|---|---|---|
| Acid Spirit | 1 | 2½ |
| Oil | 7 | 13 |
| Pitch | 12 | 14 |
| | 21 | 13½ |
| Loſt | 0 | 2½ |
| | 22 | |

### III.

8. BUT having procured four ſeveral Quantities of *Norway* or *Swediſh* Tar, which was not ſo ſtiff, but more ſoft and oily than the Tars mentioned in Numb. 3. and which were eſteemed by the Dealers in Tar to be very good for the common Purpoſes of Tar; I found much leſs Tar in the Tar-waters made with theſe, *viz.* only between five and fifteen Grains; and that, whether the Water were made by ſtirring four Minutes, or by dropping the ſame Tar five ſeveral times on the ſame Water, thro' the above-

mentioned Strainer; ſo that the Strainer was of little uſe, to leſſen the Quantities of Tar, in theſe kinds of Tar-waters; tho' of uſe, the better to adjuſt the ſeveral Degrees of Strength deſired: And alſo of conſiderable uſe, in abating the Quantities of Tar, in the Tar-waters made both of the ſtiff Tars, and alſo of the coarſe *American* Tar, as appears by comparing the Events of each Manner of Preparation in Numb. 3, and 4. where it was found that the Tar-water made with the ſtiff Tar by ſtirring, had, in a Pint of it, forty-four Grains of *Reſiduum*; and by dropping, eighteen Grains. The coarſe *American* ſtiff Tar had twenty-eight Grains by ſtirring, and but ſix by dropping. But it was obſervable, when the Tar dropped on the Water thro' the Strainer, that the Quantity of Oil which ſeparated from two of theſe thinner Tars, as it floated on the Surface of the Water, hindred the dropping Tar from ſinking into the Water: For which reaſon it was needful, from time to time, to put the ſwimming Oil and Tar gently by with a Stick, and make it ſink: But the Oil of the other Tars did not prevent their ſinking down to the Bottom of the Water. Some of theſe Tars dropped very well through Holes, which were one eighth of an Inch in Diameter, without being forced through with the Plug.

9. 'Tis probable, that the greater Degree of Oilyneſs of theſe thinner Tars may prevent, in ſome meaſure, the groſſer Tar from incorporating with the Water in ſtirring. And perhaps, on the ſame account, they may likewiſe have ſomething leſs of what is called the acid Spirit: for the Water made with old, ſtiff, leſs unctuous Tar, and with ſtiff *Norway* Tar, ſeems to taſte ſenſibly ſtronger of the acid Spirit, than that made with thinner, more unctuous Tar; on which account

the ſtiffer would be preferable, were it not, that it communicates too much of its groſſer Parts alſo to the Water; which yet is in a good meaſure prevented by the Strainer, as was found in Numb. 5. The Water made with the thinner Tar taſtes much ſtronger of Soot, or Smoke, than that made with the ſtiff Tars. Theſe ſtiffer Tars may probably be the latter Runnings of Tar in burning, for the laſt Runnings are ſo ſtiff as to be Pitch: ſo that the firſt Runnings, which come off with a ſmall Degree of Fire, may probably therefore approach nearer to the Nature of Turpentine than the latter; and the Smoke being leſs burnt, gives the ſtronger Taſte.

10. SOME of the more volatile Parts doubtleſs fly off in making Tar; for, as Dr. *Boerhaave* obſerves, the ſubtile, Æthereal Oil of Turpentine riſes with a Heat equal to leſs than half the Heat of boiling Water; which is of ſo very

penetrating a Nature, that being anointed on the Surface of the Body, it will ſoon give a violet Smell to the Urine; but Drinkers of Tar-water inform me, that it does not give a violet, but tarriſh Smell to the Urine.

## IV.

11. WHEN we conſider, that in burning Wood cloſe covered up, either to make Charcoal or Tar, a conſiderable Quantity of the eſſential Salt is turned, by the Action of Fire, into fixed alkaline Salt; it ſeems not improbable, that a conſiderable part of whatever Virtue Tar-water has, may be owing not only to the ſubtile, volatile Acid of the Tar, but alſo to a fixed alkaline Salt, intimately united with the Oil of the Tar, and making thereby a penetrating, deterſive Soap. In the ſame manner as *Tachenius*'s Salt is made, by burning Roſemary in a covered Veſſel, whereby the fixed Salt and Oil are intimately united, and

thereby become a mild, alkaline, ſaponaceous Subſtance, which, as Dr. *Boerhaave* obſerves, will mix well with the Humours of the Body. And may not even the ſubtile, volatile Salt, by the ſame means, be united with the ſubtile Oil, and thereby become a very penetrating, deterſive, and attenuating volatile Soap?

## V.

12. I Filtrated theſe ſeveral Tar-waters, thro' filtring Paper, yet no Tar, nor oily Subſtance, remained in the Paper; not even of that Tar-water, which had no leſs than ninety-three Grains of Tar in a Pint of it, Numb. 4. nor were the filtring Papers, when dry, any more inflammable, where the Tar had paſſed, than in other Parts, which had not touched the Tar-water. Nor was the filtring Paper of the thinner Tar at all diſcoloured, tho' that of the ſtiff was as if ſmoked. Hence we ſee how intimately and minutely

the Tar is mixed with the Water. No wonder then, ſince Water conveys ſo much Tar thro' the Filter, that it ſhould alſo be a Vehicle to convey great Quantities of Tar into the Blood, as well as the Medicinal Virtue alſo into the fineſt and remoteſt Veſſels of the Body, in the ſame manner that the Virtues of Mineral Waters are conveyed. Now Tar thus minutely divided, and blended in a great Quantity of Water, will be much leſs heating, than a like Quantity of Tar taken by it ſelf, as is evident from many the like Inſtances.

13. AND as Tar is thus incorporated into the Water by ſtirring, ſo is the Water alſo thereby mixed with the Tar, ſo as to increaſe its Bulk very conſiderably. There is alſo a Water which ſeparates from Tar, ſome time after it is made, and that in ſuch Quantity, as to lay three or four Inches deep on the Tar. This Water, which is

ſo ſtrongly impregnated with the acid Spirit, as to ferment with Chalk, is drank by the *Americans*, as a Cure of ſome of their Maladies.

14. I obſerved that a Quart of Water, which had half a Pint of Tar ſtirred in it for four Minutes, was ſenſibly ſtronger than two Quarts of Water made with a Pint of Tar ſtirred as long a Time. And there is good Reaſon why it ſhould be ſo: for tho' a Pound of Sugar or Salt, by diſſolving throughly, will make a double Quantity of Water, juſt as ſweet or ſalt, as half a Pound will, half that Quantity of Water; yet as a large Quantity of ſo thick and unctuous a Subſtance as Tar is, cannot, by equal Times of Stirring, be ſo throughly ſtirred, as a leſſer Quantity can; ſo neither can its double Quantity of Water have ſo ſtrong a Tincture of the Tar, as the ſmaller Quantity of Water: but in the dropping way, the Strength will be in proportion

portion to the repeated Numbers of Droppings.

15. As Tar by ſtirring becomes of a lighter brown Colour, ſo it will recover its darker Colour by ſtanding; and that ſoon, if warmed.

16. In theſe Evaporations of Tar-Water, Care muſt be taken to watch, when the Sediment begins to have a Syrup-like Thickneſs, and then to ceaſe the Evaporation, elſe no certain Eſtimate can be made of the Quantity of Tar; becauſe a great Part of it would be loſt by continuing the Heat.

## VI.

17. As Tar and Turpentine are the Juices of the ſame Kinds of Trees, only procured in a different Manner, (the Turpentine being drawn off by Notches cut in the Fir-Trees while ſtanding; but Tar is procured by

laying Firwood in great Heaps, and burning it while covered, with Sods or Turfs, which cauſes the Tar to run out at the Bottom of the Oven, as it is called, in the ſame manner that Sap flows from Heaps of common Wood, while burning into Charcoal:) And as Tar-Water differs much from Tar taken in the groſs, ſo may Turpentine-Water alſo differ from Turpentine: I thought it therefore not improper to repeat the ſame Experiments on Turpentine as on Tar.

18. But as there is a wide Difference between the mild, native, eſſential Salts of Vegetables, and the ſame Salts, which, when they have undergone the Torture of Fire, are become very cauſtick; ſo there may probably be a conſiderable Difference, in the Medicinal Virtues of Tar and Turpentine-Waters.

19. I made ſeveral Turpentine-Waters, both by ſtirring and dropping, with the ſame Proportion of Turpentine and Water, as of Tar and Water; and found, that by ſtirring four Minutes, it had a too offenſive, bitteriſh, and peculiar Turpentine Taſte.

20. I ſtirred the ſame Half-Pint of Turpentine, in twelve different Quarts of Water; toward the latter Stirrings, the Turpentine grew leſs and leſs unctuous, ſo as to adhere but little to the Stirring-ſtick; nor was it diſpoſed to ſink in the Water ſo much as at firſt, being more ſpungy by much ſtirring; and it became almoſt as white as Paint of white Lead. The latter of the twelve Stirrings were gradually milder, and much leſs bitter, than the former; the Water was very little diſcoloured thereby.

21. The firſt and ſtrongeſt of theſe Waters paſſed through the filtring Paper, without leaving any viſible Turpentine; nor was that Part of the Paper, through which it paſſed, more inflammable when dry, than the other Part; yet on evaporating away a Pint of this Water, there remained ſix Grains of groſs Turpentine; and three Grains in a like Quantity of the twelfth Water.

22. When a like Quantity of Turpentine was dropped in very ſlender Threads, thrice on the ſame Water, thro' a Strainer, whoſe Holes were one ſixth of an Inch in Diameter, it had a diſagreeable Taſte of Turpentine; and yet there remained but two Grains of Turpentine on the Evaporation of a Pint of it.

23. But on only once dropping of the Turpentine, it had a mild, bal-

ſamick Taſte, which was not diſagreeable: Tho' with *Venice* Turpentine, which is drawn from the Larch-Tree, it had a ſtronger, more diſagreeable Taſte. There was a thin Oil, which ſeparated on the Surface of the Water, from the *Venice* Turpentine. And as this Oil made the Turpentine float upon the Water, it was therefore requiſite from Time to Time, gently to make them ſink with a Stick, that the dropping Turpentine might touch the Water. But there was no thinner Oil ſeparated from the common Turpentine in dropping on the Water, as there does from ſome Tars, whoſe more ſubtile Oil is ſeparated from them by the Heat of Fire, in making the Tar.

## VII.

24. AS theſe Tar and Turpentine-Waters were made with ſweet Rain-water, in which there were Water-Gnats, (for the Waters ſtill continue

to produce innumerable flying Creatures, in conformity to the great Command, at the firſt Inſtitution of Nature;) ſo it was very obſervable, that theſe Water-Gnats, and other ſmall Inſects, died, the firſt in ſix or eight Hours, the latter in thirty or forty Hours, in Tar-Water; yet neither of them were killed in the ſtrongeſt Turpentine-Water that I made; but continued brisk and lively for ſeveral Weeks: A probable Argument, that there is but little groſs Turpentine incorporated in the Water, for Turpentine kills Inſects.

25. Tho' the Degree of Fire which Tar undergoes in making, has made it thus deſtructive of the Lives of thoſe ſmall, tender Animals, yet we cannot thence infer, that Tar-Water is pernicious to Mankind, for the moſt cauſtick *American* Tar may be beſt in ſome Caſes; there being ſeveral powerful and ſafe Medicines, which have

undergone the moſt intenſe Degrees of Fire, and are conſequently become thereby ſo much the more cauſtick, ſo as inſtantly to kill ſuch little Animals; an Inſtance of this, is Salt of Wormwood. Thus alſo all kinds of fermented, diſtilled, ſpirituous Liquors, which are rendered ſo cauſtick, by the Heat of Fire which they undergo in Diſtillation, that they will inſtantly kill ſuch Inſects, yet have not the like Effect on Men: tho' happy were it for Mankind if it were ſo; for that would effectually deter them from that deſtructive Peſt, which, by its cauſtick burning Quality, however diſguiſed with agreeable Flavours, and the plauſible Name of Cordials, gradually deſtroys the Vitals, and thereby prematurely quenching the Lamp of Life, precipitates into their Graves vaſt Multitudes daily and yearly all over the World. How valuable a *Panacea* would Tar-water be, if it were as effectual a Remedy in preſerving, as the other is in deſtroying Lives! Were it poſſible in the Nature of Things, that there could be ſuch a Thing as a *Panacea*, in the vulgar Senſe of the Word, it was never more wanted than in the preſent Age, to counter-act that great Bane of Mankind. But the preſent precarious and more uncertain State of Health and Life, are better ſuited to our degenerate State, in order to reſtrain from farther Degeneracy, than ſuch a ſure Reſource for Recovery of Health would be. Yet how eagerly do Mankind catch at every Semblance of a *Panacea*, in hopes to prolong the preſent Life; tho' but too neglectful of that truly ſalutary Water of Life, which kind Providence tenders us, in order to extend Life thro' a happy Eternity!

## VIII.

26. I MADE alſo the like Experiments with *Barbadoes* Tar; this being a *Petroleum*, or Mineral Tar, which

iſſues out of the Earth, with Water from whoſe Surface it is ſcummed; and therefore a very different thing from the above-mentioned Tar of Fir-Trees. I ſtirred three Spoonfuls of it for four Minutes, both in a Quart of cold and hot Water. The Taſte of both theſe Waters was ſoft, mild, and not diſagreeable; that made with hot Water was ſomething the ſtronger taſted. It will not curdle Milk, nor kill little Water-Inſects. Being filtrated, it leaves no inflammable Matter in the filtring Paper, tho' the Paper is a little diſcoloured. On Evaporation of a Pint of the Water, the more ſubtile, volatile Parts flying away with the Heat, there remained five Grains, of a thin-ſpread, water-coloured tranſparent Subſtance, of a pungent, ſaline Taſte, which would not ferment with Spirit of Nitre. I am informed that ſome in *Dublin*, have drank this inſtead of the other Tar-Water.

27. Dr. *Meighan*, in his Treatiſe of the Nature, and very powerful Efficacy of *Bareges* Waters, in the *Pyrenean* Mountains, both by bathing and drinking, finding that their Virtue conſiſted in a *Petroleum*, with which they are richly impregnated, propoſes, for the Benefit of thoſe who cannot go to *Bareges*, the impregnating Water with *Petroleum*, for the like Purpoſes, as a ſubſtitute Remedy, where we cannot imitate the Perfection of Nature's Preparation.

28. We have ſeen in the Courſe of theſe Experiments, the Quantity of Tar that there is in Tar-Water; and the great Difference of that Quantity, made with different Kinds of Tar, and different Degrees of Stirring. Now, ſince, notwithſtanding theſe Quantities of Tar, and the additional more ſubtile volatile Oil, which flies off in Evaporation, it has yet undoubtely proved

an efficacious Remedy in many Caſes and Inſtances; it may hence be reaſonably concluded, that the Medicinal Virtue of the Water does not reſide ſolely in the Acid, but partly alſo in the unctuous oily Parts, which are ſo temper'd by the Acid, as in ſome Caſes to prevent their heating too much. But whereas in ſome Caſes, it is obſerved by Phyſicians, to be too inflammatory, it is probable, that heating Quality, may in ſome Degree be abated, by making Tar-Water, with the Strainer above-mentioned, without Stirring; thereby to diveſt the Water of a good Quantity of its groſſer, tarriſh Particles, and yet retain whatever Powers it may have to do good.

But this may be done much better by the following Methods propoſed by the Ingenious Mr. *Reid*.

It is hoped, that the Light given by theſe Reſearches, may be of uſe in skilful Hands, for regulating and adapting the due Proportions of the acid, and the oily Principles, to different Caſes and Conſtitutions. This is the proper Province of the Phyſician, which I am no ways qualified to meddle in.

# A LETTER

To the REVEREND

Dr. *HALES*,

CONCERNING

The NATURE of TAR, and a METHOD
of obtaining it's *Medical Virtues*,
free from it's *hurtful Oils*: Where-
by alſo the STRENGTH of each DOSE
may be the better aſcertained.

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By *A. REID* Eſq;

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*London*, *March* 25, 1747.

*S I R*,

IN Obedience to your Commands I ſend you a few crude Obſervations and Thoughts upon *Tar* and *Tar-water*; and ſhall be happy if they furniſh any Hint that may be uſeful to Mankind.

1. *Tar-water* has of late obtained ſuch a Reputation, as to be eſteemed by many little leſs than an *Univerſal Medicine*. However, though the Number and Variety of Cures performed by it, are equally unqueſtionable and ſurprizing, and I am far from the leaſt Inclination to depreciate thoſe Virtues from which ſo many have received Benefit; yet there want neither Arguments nor Examples to

juſtify a Suſpicion, that in ſeveral Caſes Tar-water is capable of doing Harm, when either *prepared* or *uſed improperly*. Theſe Conſiderations joined demand a more accurate Enquiry than appears yet to have been made into the Nature of that Ingredient, from which our famed Diet-drink derives its good or bad Qualities.

2. In the Seaſon for barking Trees (which I underſtand to be when the Sap begins to riſe) thoſe intended for making Tar are ſtripped to the heighth of about eight Foot from the Ground, except one ſmall Slip, of about four Inches broad, to preſerve them from periſhing. Thus they ſtand for one whole Year at leaſt, that much of the watery acid Juice of the Wood being evaporated by the Summer's Heat, while very little freſh can riſe, the Trees may thereby yield a thicker and more viſcid Tar: And on the Condition of being thus prepared depends the Bounty granted by Act of Parliament upon that Commodity imported

ed from our Plantations. Pleaſe to obſerve that this is called *Green-Tar*, and is ſuppoſed to burn or corrode the Rigging, *&c.* of Ships much leſs than that made from dead Wood, or ſuch as has lain long on the Ground; as on the other hand, that made from Trees juſt fell'd, without any previous Preparation, is too thin for Naval Purpoſes.

3. THE Trees, after this Preparation, are cut down and ſplit into very ſmall Billets, which in *Norway* are thrown into an Oven, but in *Sweden* and *America* are built up into a large Pile, in form and conſtruction reſembling the Ridge of an Houſe, and covered with Turf to ſtifle the Flame, which would otherwiſe conſume all the oily, gummy, reſinous Parts. Fire being ſet to the Pile, the heated Wood diſcharges firſt a large Quantity of a thin, tranſparent, greeniſh, acid Liquor, then a light, reddiſh Oil; after which comes the thick Tar, and at laſt Pitch. Theſe all run along a

Trench, dug before-hand under the Oven or Pile, into a large Baſon, from whence the Tar is filled with Ladles into Barrels.

4. In ſome Places they are at the pains before they barrel their Tar, to waſh it with Water, the better to clear it of the cauſtic Oils, and acid Juice, and this they call *cooling* the Tar: Others content themſelves with racking off the thinner Parts, after the thicker and heavier have ſettled to the bottom of the Barrel. In *Sweden* particularly, they have Officers who attend the Keys on purpoſe, and are ſworn to do Juſtice in this point between Buyer and Seller. The acid Juice, however, is every where thrown away as uſeleſs; only in *Finland* they work it up with red Ochre pulverized, and therewith paint their Timber-Houſes, which by means thereof laſt for 100 and 150 Years or more, in ſpite of all the Variety of ſevere Weather to which they are expoſed. This embalming Quality of the acid Juice naturally leads one to aſk upon what

Principle it is ſo carefully ſeparated from the Tar? Does Wood ever begin to decay while it retains its acid Juice? For the drieſt Billet, if perfectly ſound, yields a great deal of it; but there is none in rotten Wood. Did not this Obſervation probably teach the *Finlanders* to uſe it as they do? Is it not the Abſence hereof that renders Tar obtained from dead Wood ſo cauſtic and fiery? And is it not the Preſence of this, in ſome Quantity at leaſt, that gives green Tar the preference? May not this Juice, prepared either with Copperas or Ochre, preſerve Ships from rotting and worm-eating, as Spirit of Vitriol with Copperas does? Certainly as the Expence would be inconſiderable, ſeeing Plenty of the acid Juice may be obtained from all ſorts of green Wood, and Copperas as well as Ochre is far from being ſcarce, the Experiment ſeems to be worth trying by a trading Nation.

5. NOTWITHSTANDING the Care taken abroad to drain off the acid

Juice, yet when the Tar comes to us, and has ſtood quiet for ſome time, there appears ſtill a little thereof floating on its Surface. Till that be entirely removed, the Tar is neither ſaleable, nor entitled to the Plantation Bounty, as not being viſcid enough. The Merchant therefore ſpiles, pegs, or taps his Barrels, and by gradually tilting them from time to time, gets rid of all the clear Water; for it is ſuppoſed to be no better, and as ſuch is let run to waſte. This being gone, there remains ſtill a brown, muddy Liquor, conſiſting of the groſſer Oils and Gums diſſolved by and intimately united with ſome of the acid Juice. This alſo muſt be drawn off, before the Tar is merchantable; but it is ſaved in little Runlets, and ſold to Farmers, who therewith anoint and cure the Mange and Scab. Some again, who honeſtly mean to retail the very beſt Tar for making Tar-water, refine upon this Method, by ſetting the Cask on one End, keeping it full, letting it ſettle well, and then drawing the Tar out at bottom; by which means they are ſure to ſerve their Cuſtomers with very little of the acid Liquor.

6. THIS Account of Tar enables us to reaſon a little on the Qualities which it communicates to cold Water by Infuſion. I believe it will hardly be aſſerted that the groſs Body or *reſinous* Part thereof is ſoluble in Water, or that ſuch a Solution, if it could be made, would be a ſafe Medicine: And therefore the Preſcribers of Tar-water prudently order us to affuſe but a certain Proportion of Water, and that but once, to the ſame Tar; ſuppoſing it's Virtue to be almoſt wholly extracted by the firſt Infuſion, and that a ſecond would be uſeleſs, if not hurtful. The light, æthereal, dark-coloured Oil, which ſwims a-top, is equally averſe, of it's ſelf, to an Union with cold Water, and is beſides ſo fiery and cauſtic as to produce the moſt dangerous Effects, if adminiſter'd imprudently, even in very ſmall Quantities;

tities; being little different in it's Qualities from other eſſential Oils obtained either *per Veſicam*, or *per Deſcenſum.* This therefore is alſo rightly directed to be ſeparated from Tar-water, either by skimming or by filtering. Now, if the groſs, reſinous Parts of the Tar, and the hot, inflammatory, cauſtic, æthereal Oils are allowed to be thrown aſide as uſeleſs, or more truly miſchievous, there remains nothing now that is capable of yielding any Virtue to cold Water, but the clear acid Juice, and the muddy Liquor mention'd above, §. 5. The latter of theſe is only the groſs Sediment of the former, and conſiſts of the heavy, half-burnt, and conſequently cauſtic, Oils and Gums, ſo diſſolved and united with ſome of the acid Juice as to mingle readily enough with Water, giving it a dirty Colour, and a nauſeous Taſte, extremely diſagreeable both to the Palate and Stomach, not without the greateſt danger of Inflammation to the Bowels and Blood of ſuch as uſe it internally; nay, this muddy Sediment has a cauſtic Quality, even when applied externally; which would be much fiercer were it not moderated by the acid Juice that is combined therewith, and renders it in many Caſes an excellent Topic. With good reaſon therefore do the Patrons of Tar-water order it, after being well ſtirred with the Tar, to ſtand quiet for ſome time, that it may be clarified by depoſiting this muddy Sediment.

7. HITHERTO there is no wide diſagreement between the Tar-water-makers and me. The groſs reſinous Parts of the Tar can communicate nothing to cold Water, but what is hurtful: On this Principle it is agreed that Tar-water ſhould not be made twice from the ſame Tar. The light æthereal Oils are ſo fiery and cauſtic, that they cannot be ſafely adminiſtered internally, without as much Caution as is neceſſary with regard to eſſential Oils; and 'tis accordingly agreed that they ought to be ſeparated by skimming, or rather filtering. The heavier,

groſſer, half-burnt Oils and Gums, which ſink to the bottom of the Tar-water or of the acid Juice, and therewith make a compound muddy Liquor, are alſo rejected by Conſent as an internal Medicine, for Reaſons of much the ſame Nature. So that at laſt we are reduced to ſeek the Medical Virtues of Tar in the clear, pellucid, greeniſh, acid Liquor ſo often mentioned; and here indeed, and here only I believe they will be found to reſide. This ſeems to be the native, nouriſhing Sap of the Vegetable, except that, by the Preparation of the Trees, and the Heat of the Fire, it has loſt ſome of it's moſt ſubtile Spirit; and it conſiſts of a pure Water impregnated with the penetrating, active, acid Salts of the Wood, by means whereof the fineſt Parts of the eſſential Oil are perfectly diſſolved, and moſt intimately united therewith, ſo as to riſe together with the ſmalleſt Heat, unhurt by the Fire. Mean time the Oil is altogether undiſcernible to the Eye, unleſs by it's natural, greeniſh Colour, either when alone, or when you add to it a greater or leſſer Quantity of ſimple Water; only upon the firſt Admixture a few Streaks diſcover it, but ſoon diſappear. This Compound therefore appears to be a true, volatile, fluid, acid Soap, and both from it's Compoſition and Experience will be found an excellent, attenuating, deobſtruent, alterative Medicine: and tho' I do not pretend that it is a proper, much leſs a ſovereign Cure for all Ailments whatever, yet I am fully perſuaded it may be ſo prepared as to be much more beneficial, where it is proper, and much leſs hurtful, where it is improper, than the Tar-water prepared in the uſual manner.

8. If what I have ſaid above be juſt, it is plain that the Makers of Tar abroad, and the Venders of Tar at home, take a great deal of Pains to rob it of all that is medicinally uſeful, and that the more conſcientiouſly careful they are to provide their Cuſ-

tomers with the beſt Tar, ſo much the more unfit do they render it for preparing wholeſome Tar-water. Nay, this is evidently true, go upon what Principle you will; unleſs you ſhould think, as I am confident you cannot, that the admirable Virtues of Tar-water are derived ſolely from the groſs reſinous Body of the Tar. If they are, I ask again, (for the Queſtions ſeem of Conſequence) what ſignifies the Caution of drawing Tar-water but once from the ſame Tar, and leaving as much of the groſs Part as can be left behind? If they are not, then why are all the finer, thinner Parts drained off with ſo much Care from the groſſer, ſo as to leave little elſe behind? Very little indeed that can be taken up by Water, beſides ſome of the hot aduſt Oils and Gums diſſolved by a ſmall Portion of the acid Juice: And if theſe are of Service, why are they drain'd off from the Tar, and why muſt they ſettle to the Bottom of the Tar-water, before it is fit to be uſed? Ought it not rather to be drank whilſt yet muddy with them? On the contrary, you are juſtly cautioned againſt Tar-water of too deep a brown Colour, which is owing wholly to the burnt Oils ſwimming therein; that is, to the muddy Liquor. If the fiery æthereal Oil be a good Ingredient, why then is it skimmed off, or ſeparated by the Filter? Again, If the acid Juice be not beneficial, why is its Preſence made the Teſt of good Tar-water, which is eſteemed better or worſe as it diſcovers more or leſs thereof? If it be, why is it ſo carefully drain'd off from the Tar, and ſo careleſsly thrown away? Fortunately indeed for the Drinkers of Tar-water, ſome ſmall Portion of the acid Juice, notwithſtanding all the Pains taken to get rid of it, ſtill remains with the Tar, or elſe it muſt e'er now have done an infinite deal of Miſchief, andloſt that Reputation to which, but for this Acid, it could have no Title. However, the browniſh

Colour, the diſagreeable Smell, and above all, the nauſeous Taſte of the Tar-water commonly uſed, ſufficiently ſhew that the very ſmall Quantity of the acid Juice taken up thereby, carries with it much of the aduſt, heating, inflammatory, cauſtic Oils and Gums; that is, the clear acid Juice having been almoſt entirely drawn off, the Water has nothing to work on but the muddy Liquor or Sediment, the Qualities whereof are ſhewn above: And to this we may fairly and naturally aſcribe all the Prejudice done by Tar-water, eſpecially to hot, bilious Conſtitutions. I have lately heard an Inſtance to confirm me in this way of thinking, which ſeems to deſerve your Notice. A Phyſician of my Acquaintance at *Dumfreis*, having endeavoured according to Art, but in vain, to cure a Servant-Maid quite worn out with Illneſs, had recourſe at laſt to Tar-water, which in a very ſhort time reſtored her to perfect Health. The Footman obſerving this good Effect, went to the Jar in which the Tar-water ſtood, and took a Draught of what the Maid had left. This proved to be the browniſh muddy Sediment of the Tar-water; for the Maid had drank moſt of what was clear; and it produced ſuch a terrible Inflammation in his Bowels and Blood as had well-nigh coſt him his Life, which was for many days deſpaired of, and his Friends call'd in to ſee him die. I do not, however, pretend that theſe, like other eſſential Oils, for ſuch they are, may not be of good uſe, when prudently and moderately adminiſter'd to Patients of cold, languid, flaccid, effœte Conſtitutions; but I labour to prove that they are not fit to be given to every body, nor by every body, becauſe they may do irreparable injury to many; that all Tar, eſpecially that which is honeſtly but ignorantly ſold as the beſt, is not fit for making wholeſome Tar-water;

that thoſe who prepare Tar-water, either for Sale or their own Uſe, are ſeldom competent Judges when it is well or ill made; that the more conſcientiouſly they go to work, the worſe they ſucceed, and muſt do ſo as long as they act upon wrong Principles; that by ſeparating and throwing away the acid Juice of the Tar they rob it, as far as they can, of all Medical Virtue; that tho' a ſmall part of the acid Juice, after all their Care, ſtill remains with the Tar, yet as there muſt needs happen to be more of it in ſome than in other Tar, it is not poſſible for the beſt Judge to aſcertain the due Proportion of Water to Tar; that as the heavier and groſſer Parts ſubſide to the bottom, the upper-moſt Parts will contain more of the acid Juice, than the undermoſt; therefore it is ſcarce poſſible for the moſt accurate Operator to prepare Tar-water twice of the ſame Quality, tho' each time he uſes freſh Tar out of the ſame Barrel, and in the ſame Proportion to Water; and that therefore the pure acid Juice, if it could be had, would be in all reſpects the proper Ingredient to mix with Water for a wholeſome Diet-drink, as that native, oily, volatile, acid, liquid, Soap contains all the good Qualities of the Tar, is free from all the Inconveniencies objected to, and as the Strength of each Doſe may by means thereof be more exactly determined, and it's true Effects better aſcertained, than can ever be done by the preſent looſe, uncertain manner of preparing Tar-water.

9. FINDING it difficult, at preſent, to get any Quantity of this pure acid Juice, as originally diſtilled from the Wood in making Tar, I bethought my ſelf of trying what I could obtain from the muddy Sediment, commonly ſold to Country-folks; and having procured a ſmall Keg thereof, I filtered ſome of it, firſt by itſelf, and afterwards with a large Mixture of Water; but to little purpoſe, for it ſtill remained muddy and full of a groſs, hot Oil. Therefore I put about ſix Quarts thereof

unmixed into a Glaſs-Retort, luted on a Receiver, and with a gentle Sand-heat drew off it's acid Juice, which it yielded much purer, and in greater Quantity than I expected. Mean time a very ſubtile, penetrating, acid Spirit perſpired inceſſantly through the Lute, which I therefore frequently renewed. When I perceived the Contents of the Retort to grow very thick and viſcid, I put out the Fire, ſuffered all to cool, and took off my Receiver, in which I found about three Quarts of a clear acid Liquor, with near a Gill of a dark-coloured, cauſtic, æthereal Oil ſwimming on it's Surface. In the Retort there remain'd a black, glaſſy, tough Pitch. Some part of the æthereal Oil I skimmed off, and having carefully ſeparated the reſt by Filter, firſt thoroughly wetted, and kept always nearly full during the Operation, that the Oil might not inſinuate itſelf thro' the Paper, I obtained a very pure, clear, acid Juice, not ungrateful to the Palate, and ſo ſtrong that one Part thereof added to Thirty-two Parts of Water made an agreeable Potion, perfectly fine, and free from thoſe groſs, empyreumatic, hot Oils, which render common Tar-water unpleaſant to the Taſte, nauſeous to the Stomach, and often prejudicial to Health. The niceſt Lady, or the tendereſt Child, may drink this Preparation without the leaſt Reluctance: and I dare ſay, it will be found at leaſt equal, in it's good Effects, to the beſt Tar-water made in the common way, and for ſafety much preferable; not only becauſe it is free of thoſe Ingredients which may prove hurtful in the other, but chiefly becauſe by this Method of obtaining the Medical Virtues of Tar without any of it's noxious Qualities we gain this important Advantage, that the Strength of the Doſe may be more accurately determined, and the Medicine itſelf by that means better accommodated to each Patient's particular Caſe, than by any other that I know of; unleſs the native acid Juice, juſt as it diſtills at firſt from the Wood in the making of Tar, may be eſteemed fitter for the purpoſe, when it can be had. I heartily wiſh the Gentlemen of the Faculty would think this Subject worthy of their Attention, and give ſuch Directions about it to their Pharmaceutical Operators, that every Man may not be left to quack for himſelf, and ſo through mere Ignorance to ruin inſtead of recovering his Health. Mean while Meſſieurs *Mackenzie* and *Watts*, Oilmen in *Biſhopſgate-Street*, having deſired and received my Inſtructions for preparing the acid Juice of Tar in the manner aboved ſpecified, will I ſuppoſe ſoon be ready to ſupply ſuch as may be inclined to uſe it, without the trouble of diſtilling it themſelves.

10. To thoſe, however, who chuſe to continue the preſent Method of making Tar-water, I beg leave to recommend it as a proper Experiment for trying the goodneſs of their Tar

before, or of their Tar-water after it is made, to pour a little thereof on ſome bits of Chalk: If an Efferveſcence does not preſently follow, then they may be ſure the Tar or Tar-water is not fit for their Uſe; but the ſtronger the Efferveſcence proves, ſo much the better are they to be counted. It is alſo proper to caution thoſe who may attempt to diſtill this Acid, eſpecially from a thick Tar, that they ought to be careful not to raiſe the Fire too high, and to put it out as ſoon as the Balſam in the Retort grows pretty viſcid; leſt, if urged then too ſtrongly, it ſhould ſwell and run over, and ſo endanger both the Operator and the Houſe. If you perceive a black, thick Smoak to riſe into the Neck of the Retort, or come over into the Receiver, ſtop quickly, for you have already gone too far.

11. I have all along taken it for granted, that Tar is poſſeſſed of excellent Virtues, which it communicates to cold Water by Infuſion. This cannot

not be denied, becauſe a Multitude of Facts have appeared to vouch it, ſince the firſt Publication of the Benevolent Biſhop of *Cloyne*'s learned, elegant, entertaining Recommendation of it. But at the ſame time I have endeavoured to ſhew that, by improper Management, Water may acquire from it ſome hurtful Qualities, and alſo how that Inconvenience may be avoided; but particularly that it's ſalutary Effects muſt be attributed wholly to the native, oily, acid Sap of the Vegetable. I ſhall next ſhew that there is both Authority and Experience for aſſigning ſuch Virtues to the acid Juice of Vegetables.

12. For the former, as I have not leiſure, neither do I think it neceſſary to conſult the Ancients; and ſhall only obſerve that *Pliny*, who compiled from the Works of all his Predeceſſors whatever he thought valuable, writes thus in his Hiſtory of the World, B. xvi. C. xi. "*Pix liquida in Europa e teda* "*coquitur, navalibus muniendis, mul-*

“ *toſque alios ad uſus. Lignum ejus* “ *conciſum furnis undique terra cir-* “ *cumdatis igni fervet* :” [This is the true reading; ſee *Dalecamp*'s Edition.] “ *Primus ſudor aquæ modo fluit ca-* “ *nali: hoc in Syria Cedrium vo-* “ *catur, cui tanta vis eſt, ut in Æ-* “ *gypto corpora hominum defunctorum* “ *eo perfuſa ſerventur. Sequens li-* “ *quor, craſſior jam, picem fundit.*” Hence we ſee, that the Ancients drew Tar from Wood, much in the ſame manner as the Moderns do, and that they took Notice of the acid Juice which firſt diſtills in the Operation: But as to the Uſes thereof nothing is here ſaid, except that the *Ægyptians* employed that of Cedar to embalm and preſerve dead Bodies withal; which I do not find that the Antiquarians, in their Reſearches into the Nature of Mummies, have ever obſerved; nor what the ſame Author B. xxiv. C. v. ſays again, “ *Cedri ſuccus ex ea quo-* “ *modo fieret, diximus.* —— *Defuncta*

*corpora incorrupta ævis ſervat. Viventia corrumpit: mira differentia, cum vitam auferat ſpirantibus, defunctis pro vita ſit.*" He adds, "*Veſtes quoque corrumpit, animalia necat. Ob hoc non cenſeam in anginis hoc remedio utendum, neque in cruditatibus, quod ſuaſere aliqui, guſtandum. Dentes quoque colluere ex aceto in dolore timuerim, vel gravitati aut vermibus aurium inſtillare.—Phthiriaſes perungere eo non dubitaverim, itemque porrigines. Suadent & contra venenum leporis marini bibere in paſſo. Facilius in elephantiaſi illinatur. Et hulcera ſordida, & excreſcentia in iis autores quidam, & oculorum albugines caligineſque inunxere eo: & contra pulmonis hulcera cyathum ejus ſorbere juſſerunt: item adverſus tineas. Fit ex eo & oleum, quod piſſelæon vocant, vehementioris ad omnia eadem uſus.*" From this Paſſage of *Pliny* it is plain the Ancients never thought of ſeparating the pure acid

Juice from the cauſtic Oils, but uſed both together; and therefore no wonder if they found reaſon to be afraid of adminiſtering the Compound internally, tho' it ſeems ſome Quacks ventured upon it now and then. Nay, our Author declares even againſt waſhing the Mouth with it in the Tooth-ach, leſt it ſhould be prejudicial, *ex aceto*, by it's Acidity; not conſidering that the Miſchief was owing entirely to the cauſtic Oils. However, he ſeems to come readily enough into the mere external Uſe thereof, in Caſes where both the acid Juice and hot Oils are allowed to be of ſervice. 'Tis true, I can gather nothing from theſe Quotations altogether in favour of the internal Uſe of acid Juice; but ſo far as the Experience and Authority of the Ancients goes, they confirm what I have ſo often inculcated concerning the cauſtic Oils.

13. FROM *Pliny* down to *Glauber* I can recollect nothing that intimates any Notice or Uſe of this acid Juice;

unleſs you will allow it to have been *Van Helmont's volatile Salt of Tartar*, which he praiſes ſo immoderately, and to which he aſcribes Powers very little inferior to thoſe of his boaſted Alcaheſt. Indeed, as the Cryſtals of Tartar contain the native acid Salts and eſſential Oils of the Vegetable, ſo this Juice conſiſts of thoſe ſame Principles, but exceedingly more fine, volatile, and free from thoſe groſs Parts with which Tartar abounds. It ſeems therefore, that it may be juſtly called the *Sal volatile oleoſum Tartari.*

14. THE induſtrious *Glauber* comes next; and he in his *Firſt Part of Philoſophical Furnaces* ſhews profeſſedly, "how to diſtill an acid Spirit or "Vinegar out of all Vegetables, in "great Quantity and at ſmall Expence, which he affirms to be "good in many "Diſeaſes, cauſing Sweat wonderfully "when taken internally, eſpecially "that which is made of Oak, Box, "Guaiacum, Juniper, and other heavy Woods; for how much heavier

“ the Woods are, ſo much the more “ acid Spirit do they yield. Being “ uſed outwardly it mundifies Ulcers, “ conſolidates Wounds, extinguiſhes “ and mitigates Inflammations cauſed “ by Fire, cures the Scab, but eſpe- “ cially if a Decoction of its own “ Wood be made in the ſame. “ Being mixed with warm Water “ for a Bath for the lower Part of the “ Body, it cures the Diſeaſes thereof, “ and particularly malignant Ulcers “ of the Legs.” Nay, ſo thoroughly was he convinced of the great Virtues of this acid Juice, that he thought it worth while to contrive a peculiar Furnace for procuring it, an Account of which, and it's Uſe, he gives us in the Continuation of his *Miraculum Mundi*, *Arcan.* I. It may not be amiſs to make a few Extracts from him, relating chiefly to the Medical Uſes of the *Vinegar of Wood.* He obſerves, “ that the expreſſed (it ſhould be *diſ-* “ *tilled*) Juice carries along with it “ a ſharp, hot Oil, of a dark reddiſh

“ Colour; that if this acid Spirit be
“ rectified (or *freed from the afore-*
“ *ſaid Oil*) it may be uſed in the
“ Preparation of good Medicines, and
“ for all Purpoſes for which common
“ Vinegar is uſed; yea, far more
“ commodiouſly, becauſe it much
“ exceedeth that in Sharpneſs. Nay,
“ of itſelf alone it cureth many other-
“ wiſe incurable Diſeaſes: being mix-
“ ed with warm Water, in the Pro-
“ portion of one Part of acid Juice
“ to ten Parts of Water, more or leſs
“ as Circumſtances require, it is a
“ more efficacious Bath than any that
“ iſſues out of the Earth; particularly
“ in all Scabs, Foulneſſes of the Skin,
“ the *French* Diſeaſe, fiſtulous and
“ ſtinking Ulcers in the Legs and
“ other external Parts. Alſo in the
“ Gout, Stone, Cramp, Sciatica, Pal-
“ ſy, and all ſorts of Ailments for
“ which Baths are proper, this Vine-
“ gar of Wood far excelleth in ſalu-
“ brious Virtues. The hot Oil alſo,
“ which riſeth with the acid Spirit,

“exerteth a wonderful Efficacy in curing external Ulcers and other Ailments. Thoſe who uſe this Bath ſhould, before they go into it, drink ſome Spoonfuls of the Vinegar of Wood; which, by penetrating the whole Body, caſteth out all Things ſuperfluous and noxious to Nature by Sweat, and openeth all Obſtructions of the Liver, Spleen, and Lungs; eſpecially when the Vinegar is drawn from a Vegetable naturally proper to correct the Diſeaſe.” [*Here he enters into a Detail of Vegetables, and their peculiar Properties, agreeable to his idle Notion of Signatures.*] “A few Drops of the Oil (*before ſeparated*) may alſo be added to the Spoonfuls of Vinegar taken before the uſe of the Bath, which ſo fortifieth the acid Spirit, that it more readily penetrateth the Body, more forcibly aſſaulteth the Diſeaſe, and the ſooner expelleth it. In gouty Pains, and in the Stone of the Kidneys,

“ the Oil and acid Spirit together being
“ rubbed on the Part affected, give a
“ Relief not to be contemned. In ſhort,
“ this Juice of Woods and Herbs, duely
“ prepared and uſed, is ſo efficacious a
“ Medicine, that the moſt coſtly *Galeni-*
“ *cal* Compoſitions muſt give it place.”
Now, tho’ I do not quote *Glauber* either as a Phyſician, or Philoſopher, yet he certainly was an experienc’d Chymiſt and Apothecary; he was withal, as far as I can find, exceeding honeſt, when he ſpoke plain enough to be underſtood, and would hardly have ſaid ſo much in praiſe of the Vinegar of Woods and Herbs, if he had not proved its Efficacy. But, tho’ he might have good Cauſe to recommend the internal Uſe of the acid Liquor in ſo many various Diſtempers, yet I cannot help thinking that he judged wrong in adding to it generally the cauſtic æthereal Oil, even in a ſmall Quantity; and the Reaſon he gives for ſo doing is more ſpecious than Philoſophical.

15. The celebrated Mr. *Boyle* wrote much about the ſame time with *Glauber*,

and tho' in his *Scept. Chym.* Part III. he ſays he had not tried any Medical Experiments with the acid Juice of Vegetables, yet he makes his Friend obſerve, that " they are ma-" nifeſtly endowed with peculiar and " powerful Qualities, ſome of which " may probably be of conſiderable " uſe in Phyſic, as well alone as " aſſociated with other Things." In his *Producibleneſs of Spirits*, he makes ſeveral Remarks and Experiments on the acid Juice of Vegetables, " but " owns he had not diſcovered their po-" ſitive Properties." The acid Juice he ſeparates into two Parts, an acid and a neutral Spirit; the former whereof he ſeems to think the moſt ponderous, but far from being the greateſt in Quantity; [Obſerve that he made uſe of the diſtilled Acid of *Box-wood*] and that the hardeſt Woods yield the ſtrongeſt Acid. He adds, " Whether our adiaphorous [*neu-" tral*] Spirit may (as I ſometimes ſuſ-" pected it may) be generated by a " commixture of the finer Parts of the

" Oil of the Wood reduced to an ex-
" traordinary ſmallneſs, and thereby
" made capable of being exquiſitely
" mixt with the Phlegm, and ſtrictly
" aſſociated with it's Particles, I ſhall
" ſtay till I be better furniſhed with Ex-
" periments before I venture to deter-
" mine."

16. THE great *Boerhaave* is much more particular and directly to the Purpoſe. He treating in his 32d Proceſs of the Oils, Vinegar, Spirits, *&c.* procured from Guaiacum Wood by Diſtillation, obſerves, " that all Trees, and Shrubs
" univerſally, as well as a great many
" Herbs, treated in the ſame manner
" yield the ſame things; and particularly
" a Water containing an acid, oily, vola-
" tile Salt, which being properly depu-
" rated and rectified, has a very pene-
" trating, aperient, attenuating, anti-
" ſeptic, detergent, and ſaponaceous Vir-
" tue, and on theſe Accounts is antiſcor-
" butic, diuretic, diaphoretic, and ſu-
" dorific: externally alſo it is of ſervice."
And again, " this diſtilled Vinegar is
" compoſed

" compoſed of Water, an Acid, and an " Oil, and conſequently may with the " greateſt juſtneſs be called an oily, ſa- " ponaceous, volatile, acid Salt." In Proceſs 35, treating of the Vinegar, Spirits, Oils, &c. procured in the ſame manner from Turpentine, he tells us that " the acid Water which it yields, " if perfectly freed from it's Oil, and " rectified, is perhaps one of the beſt " vegetable Acids we are acquainted " with; that it is eager, antiſeptic, pe- " netrating, and endued with conſide- " rable medicinal Virtues, but eaſily " exhales: that the nutritious Juice is " acidiſh and watery when firſt taken " up from the Earth by the Plant, in " which it gradually depoſites it's pin- " guious, oily Particles. Is the native, " volatile Acid, ſays he, that reſides in " this pinguious, oily Liquor and Water, " of the ſame Nature with the aromatic " Spirit of other eſſential Oils? Certain- " ly, in theſe native pinguious Sub- " ſtances it is contained and mixed in " ſuch a manner, that with the Water

"it lies concealed under one uniform
" Appearance."

17. I hope I have now produced ſufficient Authority for my Opinion: but as Experience is the ſureſt Teſt, I appeal to the immemorial Practice of thoſe who live near the Places where Tar is uſually made. They, inſtructed by Chance and convinced by Experience, uſe Tar-water for all Complaints; not indeed ſuch as we make here; for they drink the pure, acid Liquor which ſwims naturally on the Surface of the Tar, after all the groſs Parts have ſubſided, and the æthereal Oil is skimmed off. Some take it alone, others mingled with a little Water: thoſe only make it in ſome meaſure, tho' not ſo badly, as we do, who are forced to bring their Tar from a diſtance. It has alſo been long uſual, even among us, for conſumptive, decayed, worn-out People, to repair to the *Red-houſe* at *Deptford* as their laſt Reſort, there drink the clear Liquor from the barrelled Tar, and be cured. I believe I am well inform'd as to theſe Facts,

and if they be true, they fully juſtify all I have advanced in favour of the acid Juice of Tar.

18. I have §. 13. intimated an Inclination to believe and call this acid Juice a *Sal volatile oleoſum Tartari.* *Boerhaave* tells us that "ſome of the "moſt skilful Chymiſts have aſſerted "Vinegar to be a volatile Tartar of "Wine; becauſe Tartar is the moſt "acid Part of Wine, but not volatile; "and Vinegar is Wine converted into "an Acid, but a volatile one." He "adds that it is a volatile, oily, acid "Salt;" and by theſe Characters this Production of Art ſeems not altogether unlike the native acid Juice of Vegetables. There is alſo a great Affinity in their Effects; for the ſame Author aſſures us that "Vinegar is vaſtly beneficial to "the human Body, by it's Acidity reſiſting Putrefaction, ſo incident and ſo "dangerous to the animal Humours, "while at the ſame time it is ſoften'd "and render'd leſs acrid by it's Oils; "that it is ſo penetrating as to make

" it's way, without any ſeparation of " it's Parts, through almoſt the whole " human Body, and exert it's proper " Powers there, eſpecially being aſſiſted " by the natural Heat and vital Motion; " that it will readily mix with all the " animal Fluids, by which Property and " it's penetrating Power it produces admirable Effects; that in Fevers, cauſed " by an acrid Bile, an alcaleſcent Salt, " or any thing putrid generated in the " Body, it is an admirable Cooler of " the internal Heat, and a Quencher of " the Thirſt which attends them; that " in ſuch Caſes *Dioſcorides* and *Hippocrates* extol the uſe of Vinegar and " Water, eſpecially when rendered " milder by an addition of Honey; that " in external Maladies, ſuch as Ereſypelaſes, Phlegmons, and putrid Ulcers, the Surgeons find it of the greateſt Service; that a Man dead drunk " may be rouſed by giving him Vinegar; that to weak, languid, drowſy, " lethargic Perſons, and thoſe afflicted " with Faintings and Vomitings, he had

" given Relief by applying Vinegar to " the Noſe and Mouth, or adminiſtring " it inwardly, when every thing elſe " fail'd; that even in convulſive, hypochondriacal, and hyſterical Caſes " he had known it do good; that in " a true Putrefaction and deadly Corruption of the Humours, and in preventing the ſpreading of a Gangrene, " it has ſcarce it's equal; that in acute " Fevers therefore, in malignant putrid " Fevers, in the Plague, Small-Pox, " Meaſles, and the like Diſtempers, " where volatile alcaline Salts are uſed " with ſuch unhappy Succeſs, Vinegar " is an excellent Medicine; that it is " a moſt certain and efficacious Sudorific, procuring Sweat, taken either " alone or diluted, in malignant Diſtempers, where hardly any thing elſe " ſucceeds." Such, according to our great Author, are the wonderful Effects of Vinegar prepared according to Art, not of ſuch as is ſold for common uſe, too often adulterated with Vitriol, and at beſt full of Yeaſt.

But Tar-water duly prepared, the acid, oleous, Juice of Wood, the Vinegar of Nature, boaſts the ſame and much more extenſive Virtues, as appears from the Biſhop of *Cloyne*'s and Mr. *Prior*'s Accounts of the Effects of Tar-water, made even in the common manner. This natural Vinegar is more eaſily and certainly prepared pure and good than the artificial one, and is much richer of the native Oils, ſo as to want no addition of Honey to render it milder, while the other is in preparing it by Fermentation deprived of a great deal thereof; whereas here the Sap, the Salts, and Oils are all nearly in their native State, ſeeing they are procured ſaturated with each other, by ſuch a gentle Heat, that they may rather be ſaid to be expreſſed than diſtilled.

19. MAY not this compound Juice be called the Chyle of Plants? It would ſeem that the pinguious Parts of the Soil being diſſolved by the univerſal Acid of the Earth, and intimately united with elementary Water, are rarified by the

Heat of the Sun, attracted or imbibed by the fine Veſſels of the Vegetable, and carried up together for the growth and increaſe thereof; and then the Water with the Acid gradually perſpiring leaves the pinguious Parts behind, firſt in the form of Oils, then of Balſams, next of Gums, and laſtly of Reſins. Is not this the *Spiritus Rector* of Oils and Balſams, to which *Boerhaave* inclines to aſcribe their Virtues? For if the acid Juice be ſuffered to exhale in the open Air, or be expelled by Fire, the thinneſt Oils become by degrees thick, unctuous Balſams, then ſtiff Gums, and at laſt friable Reſins, always as they change loſing more and more of their medical Efficacy. If ſo, 'tis not ſtrange that this Juice ſhould eaſily diſſolve even Myrrh it ſelf, nor therefore that it ſhould produce ſuch ſalubrious Effects in the human Body, by diſſolving gummy Concretions, Viſcidities, and other Obſtructions to the due Circulation of our Fluids; nor why that Liquor which is the Life of Vegetables ſhould be ſo beneficial to the Health of Man.

I ſhall eſteem myſelf very happy if any thing I have ſaid may contribute to make this excellent Medicine ſtill more univerſally uſeful and ſafe; and am,

*SIR,*

*Your moſt Obedient,*

*Humble Servant,*

ANDREW REID.

*P. S.* Your Experiments in order to diſcover and leſſen the Quantity of groſs Tar in Tar-water, having led me to examine it's diſtilled acid Juice in your manner, I found that an Ounce Troy thereof being ſet to exhale in the open Air, there remain'd no gritty Tar, but only ten Grains, or $\frac{1}{48}$ Part, of an amber-coloured Rob, extremely tart, and of a bitteriſh Taſte, not unlike that of common Tar-water; ſo that as one Ounce of the acid Juice added to thirty-two Ounces of Water, makes about a Quart of good Tar-water, you have in every Half-pint thereof about two Grains and a half of this *Reſiduum*, or Soap, conſiſting of the eſſential Oil united with the Acid.

I have made ſeveral other Trials of this acid Juice, which I muſt take another Opportunity of communicating. Mean time, I am thereby much encouraged to hope that the Method of preparing Tar-water which I have pointed out will be found beneficial, and be adopted by the Gentlemen whoſe Province it is to prepare and to preſcribe wholeſome Medicines.

*FINIS.*